RRS MAINTENANCE NOTE 01 (for Electronics Technicians)
Maintenance, Logistics, and Acquisition Division
W/OPS12: KC

SUBJECT : Radiosonde Replacement System SPS - GPS Radome Antenna Initial Installation

PURPOSE : To provide GPS Satellite signals to the SPS

EQUIPMENT AFFECTED : All sites scheduled for RRS systems in the CONUS, Alaskan, and Pacific regions.

PARTS REQUIRED : The installation kit will be supplied by National Logistics Support Center (NLSC) prior to scheduled TRS installation.

EQUIPMENT	ASN	MANUFACTURER
GPS – SPS Radome Installation Kit	J700-1A4	NWS

SPECIAL TOOLS REQUIRED : None

MODIFICATION PROCUREMENT : None

EFFECTIVITY : Upon Initial Installation of RRS TRS System.

ESTIMATED TIME REQUIRED : Approximately 4 Hours

EFFECT ON OTHER INSTRUCTIONS : None

AUTHORIZATION : N/A

VERIFICATION STATEMENT : This modification note was tested the Sterling Research and Development Center, Sterling, VA.

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GENERAL:

This procedure provides the installation procedures for radome installation of the Radiosonde Replacement System (RRS) Signal Processing System (SPS) Global Position System (GPS) antenna and mounting bracket, antenna cable fasteners, and the antenna cable to the SPS.

PROCEDURE:

This procedure is intended for use by the Telemetry Receiving System (TRS) installation contractor and to provide information to National Weather Service site personnel involved with installation of the RRS. This procedure is to be carried out by two members of the installation contractor's staff. For follow-on work, TRS Manual NWS EHB-9-753 should be used to operate and maintain the radome GPS antenna.

1. Introduction

The installation of the GPS antenna in the radome should occur just prior to the installation of the TRS components. All necessary components associated with the installation of the radome GPS antenna are found in the **SPS Radome GPS Antenna Installation Kit**. This kit (ASN: J700-1A4) is available from the National Logistics Support Center (NLSC). This kit will arrive on site prior to the scheduled installation of the RRS TRS hardware suite.

Throughout this installation procedure, caution and warning icons will identify specific precautionary statements that will ensure a timely and accurate installation of the GPS Antenna within the radome while maintaining safety as priority.

2. SPS Radome GPS Antenna Installation Kit Contents

After receipt, open the installation kit. An enclosed packing slip will describe the contents of the kit. A drawing showing the assembly of the GPS Antenna mounting bracket will also be enclosed. Remove the contents of the kit and examine the packing slip. Ensure the following items are included. If any items are missing, contact the NLSC (816-926-3990).

The contents of the kit shall include the following items:

- One GPS Antenna (ASN: J700-1A4A1)
- One GPS Antenna Mounting Bracket (white Delrin bars) – 2 pieces (J700-1A4MP1)
- One GPS Antenna Cable (18-inch, RG-58 RF cable) terminated with a TNC-Male and an N Type Female connector respectively (ASN: J700-1A4W1)
- One GPS-to-SPS Antenna Cable (35-foot length of RG-213/U RF cable) with connectors. Cable un-terminated on one end (one right angle N type male connector included), with an N Type male connector on the other end (ASN: J700-1A4W2).
- GPS Mounting Installation Kit (ASN: J700-1A4MP2) - a small plastic bag containing the following:
    - One ¾ inch PVC pipe nipple and PVC retaining lock nut.
    - One right angle N Type Male connectors (a spare).
    - 10 Nylon Mounting Blocks (cable tie holders) and 10 four-inch tie wraps.
    - A dual tube of Five Minute Epoxy and three stir sticks.

- Three six-inch applicator brushes.
- Three sheets of 220 grit sand paper.
- Two ¼ inch – 20 x 2 ½ inch stainless steel carriage bolts, each with one flat washer, one lock washer, and one wing nut (for GPS antenna mounting bracket).

3. Tools Required

The following tools are required to install the GPS Antenna within the Radome:

- Safety Goggles or Glasses
- Hard Hat
- Soldering iron
- Extension cord
- 12-foot insulated step ladder
- 25-foot tape measure
- Duct tape
- Wire cutters
- Paper towels
- Pencil or marker

4. GPS Antenna Mounting Bracket Installation

To install the GPS antenna mounting bracket, perform the following steps:

1. Open the GPS – SPS Radome Installation Kit (ASN: J700-1A4). Assemble the GPS mounting Bracket as shown in Figure 1.

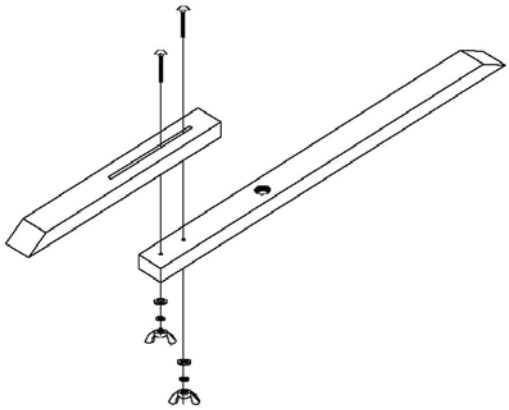

Figure 1 GPS Mounting Bracket Assembly (J700-1A4MP1)

2. Attach the 18-inch GPS Antenna Cable to the GPS Antenna prior to mounting the antenna to the mounting bracket (See Figure 2).

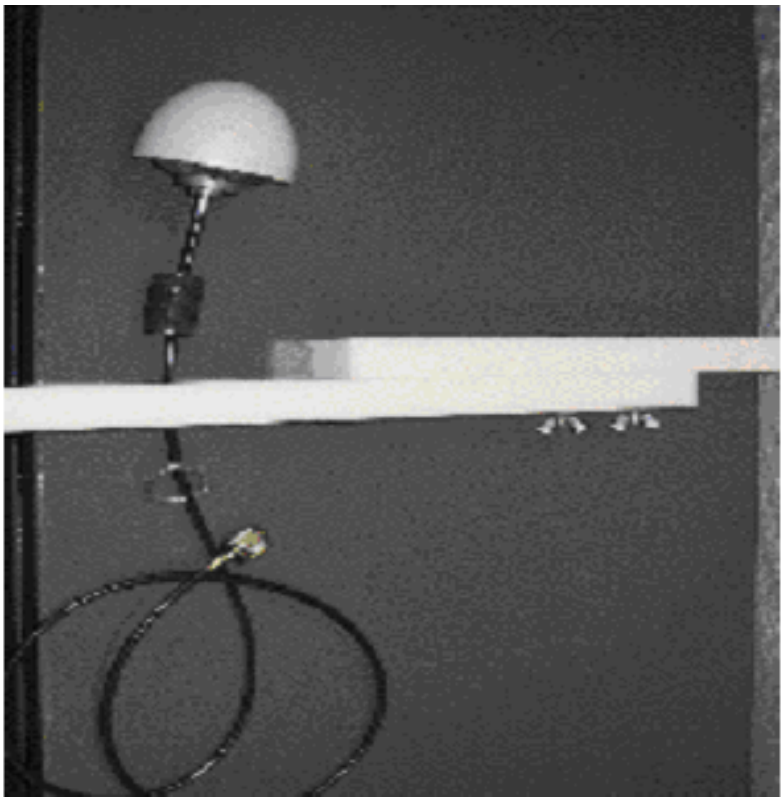

Figure 2 GPS Antenna Cable

3. Locate the 3/4-inch pipe nipple, feed the TNC-Male end of the 24-inch GPS Antenna Cable through one end of the pipe nipple, and attach this connector to the Female connector of the GPS Antenna.
4. Thread the pipe nipple to the mounting threads on the underside of the GPS Antenna.
5. Locate the GPS Antenna Mounting Bracket and find the one-inch recessed round opening on the top side of the bracket (side opposite the wing nuts)
6. Place the GPS Antenna Cable through this opening along with the pipe nipple, seating the underside of the GPS Antenna within the recessed surface on the mounting bracket and secure the threaded pipe nipple to the antenna mounting bracket using the PVC retaining nut.

CAUTION

Do not over tighten this nut as damage to the GPS Antenna may occur.

7. Loosen the two wing nuts on the underside of the antenna bracket just enough to allow the two halves of the mounting bracket to slide freely. This will allow the antenna mounting bracket to be positioned at the top of the radome, seating it to the radome vent ledge.
8. Set the assembled GPS Antenna and GPS Antenna Mounting Bracket aside.

CAUTION

Persons working within the Radome shall wear Hard Hats.

9. Inside the radome, locate the windward face of the radome. This location is the side that faces away from the direction of the prevailing winds. This face of the radome will be used to attach the GPS-SPS Antenna Cable. Ask field site personnel to assist you in determining this windward direction. Mark this surface with a pencil for reference.
10. After determining the interior face of the radome facing the windward direction, orient the 12-foot step ladder between the windward face of the radome and the TRS Electronic Equipment enclosure or the Antenna Assembly (See Figure 3).

*****WARNING*****

If the TRS pedestal has already been installed, coordinate with operations personnel to re-orient the face of the TRS receiving antenna so it points away from the windward location of the radome interior.

CAUTION

Safety regulations stipulate that personnel using step ladders must take note of their step height such that it allows the top step to rest just above the knees.

Figure 3 Step Ladder

*****WARNING*****

Make sure the step ladder does not touch the TRS electronic equipment cabinet or the TRS Antenna Assembly, as the paint finish could be damaged. Do not stand on or place any components of this installation kit on any surface of the TRS Antenna assembly or electronic equipment cabinet.

11. Using the step ladder, place the assembled GPS Antenna Mounting Bracket and GPS Antenna at the top of radome ventilation cap ledge by sliding the two halves of the mounting bracket apart, noting the position of the GPS antenna near the approximate center of the ventilation opening. **Do not tighten the wing nuts at this time**.
12. Position the mounting bracket so the end of the lower half of the mounting bracket faces towards the windward location of the radome.
13. Be sure the beveled ends of the mounting bracket are securely placed against the ledge of the ventilation cap opening, setting the beveled edges firmly against the outer edges if the ventilation cap is open.
14. Once in position, secure the mounting bracket halves by finger tightening the two wing nuts at the bottom of the mounting bracket. The 18-inch GPS Antenna Cable will hang from the approximate center of the ventilation opening.
15. This completes the GPS Antenna Mounting Bracket installation.

5. Installation of the GPS Antenna Cable Mounting Blocks

This section of the installation procedure will fasten the GPS Antenna Cable Mounting Blocks to the interior surface of the radome wall.

1. Using the tape measure, measure 2 inches outward along the top of the radome ventilation cap edge and mark this location, using the lower edge of the mounting bracket end towards the windward location as a reference. This will mark the location of the first antenna cable mounting block. From this initial 2-inch mark, measure a second mark approximately 12 inches from the initial mark.
2. Mark consecutive 24 inch spacing along the windward line until you reach the inward bend of the radome (located approximately waist high from the bottom of the radome).
3. From above and below this waist high inward bend, make a 6 inch mark. Continue to mark 24 inch spacing below the bottom mark and stop approximately 6 inches from the floor of the radome. This 12 inch spacing will allow the antenna cable to bend towards the TRS electronics enclosure and to facilitate the installation of the Liquid Tight conduit (See Figures 4 and 5).

Figure 4 Measure 6 inches from bottom of Radome floor.

Figure 5 Six inch markings above and below waist-high bend in Radome panels.

CAUTION

Always use eye protection when sanding, using abrasives, especially when sanding overhead.

4. You should have made approximately 10 marks along the windward location of the radome.
5. Using the sand paper provided, sand an area approximately 2 square inches along side each mark. This will roughen the surface of the radome to allow for better adhesion of the epoxy (See Figure 6).

Figure 6 Lightly sand surface of Radome adjacent to marks.

6. With all marked locations sanded, use the sandpaper to roughen the underside of each antenna cable mounting block. Set them aside.
7. Next, find the epoxy tube and the stir sticks. Tear a section of the cardboard flap off the cardboard container used in the shipment of the kit. This will be used as a mixing surface for the two-part epoxy.
8. Remove the cap to the two part epoxy dual container and set aside. The cap is located between the two epoxy tube plungers cut open the top of the epoxy tube container. The cap is keyed; note the flat side of the cap coincides with the flat end of the resin and hardener openings.

NOTE: There may be air pockets in the tubes. After placing the cap on the open tube end, hold the dispenser upright (plungers at top) to allow the air bubble to reach above the resin and hardener materials. This will help to ensure equal amounts of resin and hardener are dispensed when depressing the plunger.

9. Place an equal amount of each epoxy compound, about the size of a quarter, on the cardboard. Place the cap on the epoxy. Thoroughly mix the two compounds together forming a uniform mixture. This mixture will generate heat as it cures. You will have approximately 5 minutes to work with the mixture.

CAUTION

Mix only small amounts of the epoxy as the mixture cures rapidly. Mix enough epoxy to fasten two to three antenna mounting clocks at a time.

*****WARNING*****

READ THE INSTRUCTIONS ON THE EPOXY CONTAINER. Do not get any of the epoxy compounds into the eyes and mouth, as the mixture is an irritant and very toxic. Wipe any epoxy off exposed skin as soon as possible using paper towels. Wash hands thoroughly when finished. Discard any unused materials.

10. Using one of the applicator brushes, coat an area equal to the size of a half dollar on the sanded area marked on the radome. Press the antenna mounting blocks firmly into the center of the mixture, allowing the epoxy to flow into the center hole of the mounting block and around the periphery of the block. Use a new applicator brush for every three or four applications of epoxy to the surface of the radome wall.

NOTE: Do not allow any epoxy to flow into the tie wrap slots at either end of the mounting block, as this will render the block useless. Hold each mounting block firmly in place for about 15 seconds. For the antenna mounting blocks mounted on the ceiling surface of the radome, more time may be needed to allow the epoxy to adhere to the surface. See Figure 7.

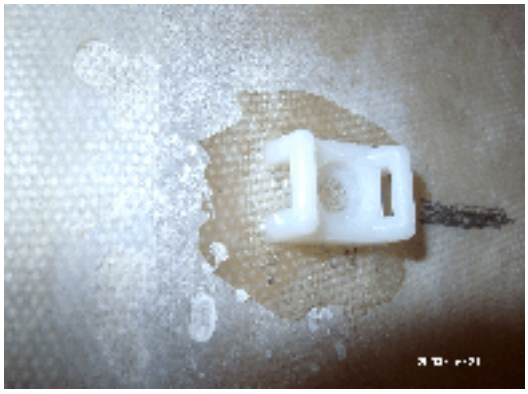

Figure 7 Epoxy must not fill end slots.

11. Tear appropriate lengths of duct tape strips and position the strips vertically to hold the antenna mounting blocks to the surface of the radome wall. Pay close attention to where the epoxy pool is located when placing the strips of duct tape onto the top surface of the mounting block. The strips of tape must be removed after the epoxy is set up, or approximately 5 minutes.

12. Repeat steps 7 through 11 until all marked locations have an antenna mounting block fastened to the windward interior wall of the radome (See Figures 8 and 9).

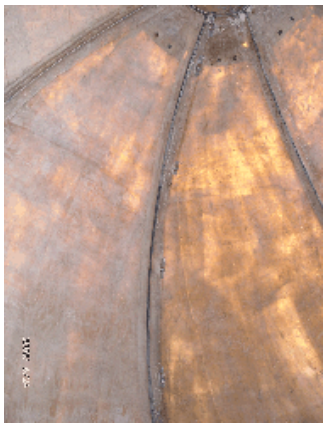

Figure 8 Antenna mounting blocks on side

NOTE: Antenna mounting blocks spaced approximately 24-inches traversing down the windward side of the radome.

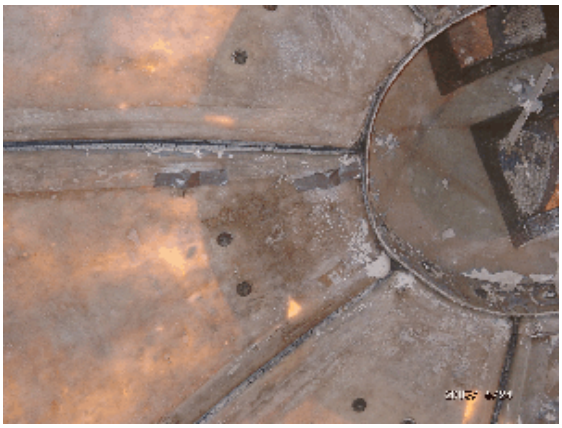

Figure 9 Antenna mounting blocks at top

NOTE: Antenna mounting blocks at the top of the radome. The duct tape securing the blocks while the epoxy cures.

13. At this point in the installation, time must be allowed for the epoxy to harden. Follow the manufacturer's instructions provided with the epoxy container.

6. Installation of the GPS-to-SPS Antenna Cable

This portion of the installation procedure will outline the steps necessary to fasten the GPS-to-SPS Antenna Cable to the mounting blocks.

CAUTION

Safety regulations stipulate that personnel using step ladders must take note of their step height such that it allows the top step to rest just above the knees.

1. Re-position the step ladder just above the top antenna mounting block near the ventilation cap at the top of the radome.
2. Uncoil and straighten out the 35-foot GPS-to-SPS Antenna Cable. Leave the N Type Male connector end of the cable inside the radome. The unterminated end of the cable may be taken out of the radome exit to facilitate the straightening of the cable.

3. Using the ladder, take two of the cable ties up to the top most cable mounting blocks and feed the pointed ends of the cable ties into the respective end slots of the top most cable mounting blocks starting from the one nearest the GPS Antenna Mounting Bracket, working outward and downward to the second mounting block
(See Figure 10).

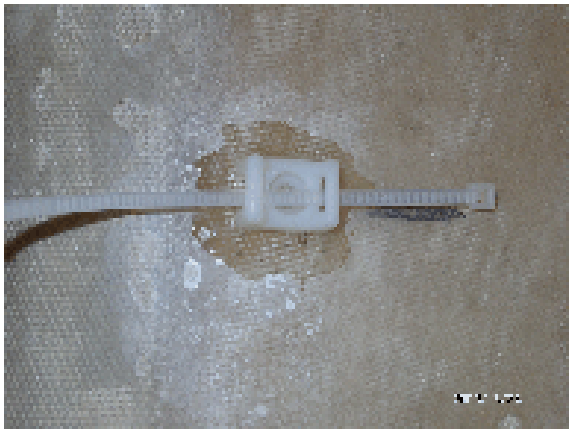

Figure 10 The wrap fed through end slots of mounting block

4. Loosely tighten the two cable ties forming a 2-inch loop (See Figure 11).

Figure 11 Antenna Mounting Brackets and Cable Connections

NOTE:	The antenna bracket and cable point towards the windward direction of the radome.

NOTE:	The cable position as it is held against the radome inner wall.

5. Have a helper hand the cable with the N Type Male connector end up to the person on the ladder and feed this end through both 2-inch loops created by the tie wraps.
6. Allow enough slack of the GPS-to-SPS Antenna Cable to hang just below the GPS Antenna cable.
7. With the GPS-to-SPS Antenna Cable against the mounting blocks, tighten the tie wraps to secure the cable in place. Allow the N Type Male connector end to hang about 12 inches below the GPS Antenna Mount. **Do not tighten the cable ties at this point.**
8. Fasten the N Type male and female connector ends together and hand tighten.
9. Hold the co-joined antenna cables against the top most mounting blocks and firmly tighten the cable ties. Using wire cutters, cut off the excess end of the two cable ties, leaving one-half inch extending beyond the cable tie keeper. The assembled cables should be supported by the two cable mounts at the top of the radome at this point in the installation.
10. Re-positioning the ladder, continue to fasten the GPS-to-SPS Antenna Cable to the Antenna Cable mounting Blocks, using the remaining tie wraps, one per mounting block.
11. After completion of the cable mounting, coil the remaining GPS-to-SPS Antenna Cable at the radome shell. Secure the coil bundle with a piece of duct tape.
12. Leave the right angle male N connector for future installation on the cable during SPS installation.
13. Remove the step ladder from the radome, noting the ladder's orientation between the inner wall of the radome and the TRS antenna and electronic equipment cabinet (if the TRS antenna and pedestal are installed at this time).

Signature Not Verified

Mark S. Paese

Digitally signed by Mark S. Paese
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